ehp Environmental Health PERSPECTIVES
ehponline.org
Published by the National Institute of Environmental Health Sciences

# Identification Of Metabolites Of Trenbolone Acetate In Androgenic Runoff From A Beef Feedlot

**Elizabeth J. Durhan, Christy S. Lambright, Elizabeth A. Makynen, James Lazorchak, Phillip C. Hartig, Vickie S. Wilson, L. Earl Gray and Gerald T. Ankley**

**doi:10.1289/ehp.8055 (available at http://dx.doi.org/)**
**Online 12 October 2005**

**The National Institute of Environmental Health Sciences**
**National Institutes of Health**
**U.S. Department of Health and Human Services**

# Identification Of Metabolites Of Trenbolone Acetate In Androgenic Runoff From A Beef Feedlot

Elizabeth J. Durhan*[1], Christy S. Lambright[2], Elizabeth A. Makynen[1], James Lazorchak[3], Phillip C. Hartig[2], Vickie S. Wilson[2], L. Earl Gray[2] and Gerald T. Ankley [1]

[1] US Environmental Protection Agency, National Health and Environmental Effects Laboratory, Mid-Continent Ecology Division, Duluth, MN 55804

[2] US Environmental Protection Agency, National Health and Environmental Effects Laboratory, Reproductive Toxicology Division, Research Triangle Park, NC 27711

[3] US Environmental Protection Agency, National Exposure Research Laboratory, Ecological Exposure Research Division, Cincinnati, OH 45268

* To whom correspondence may be addressed:

Elizabeth Durhan
USEPA, MED
6201 Congdon Blvd
Duluth, MN 55804
telephone: 218-529-5167
fax: 218-529-5003
email: durhan.elizabeth@epa.gov

*Running Title*: Trenbolone metabolites in feedlot runoff

*Key words*: environmental androgens, trenbolone, feedlot runoff

*Acknowledgments:*

We thank Dean Hammermeister and Iris Knoebl for manuscript review. This work was funded wholly by the USEPA, and is approved for publication. The contents do not necessarily reflect the views of the agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

The authors declare they have no competing financial interests.

*Abbreviations:* gas chromatography/mass spectrometry (GC/MS), high pressure liquid chromatography (HPLC), dihydrotestosterone (DHT), hypothalamic-pituitary-gonadal (HPG), single ion monitoring (SIM).

Manuscript Outline

Abstract

Little is known concerning the potential ecological effects of hormonally active substances associated with discharges from animal feeding operations. Trenbolone acetate is a synthetic anabolic steroid that is widely used in the USA to promote growth of beef cattle. Metabolites of trenbolone acetate include the stereoisomers 17α- and 17β-trenbolone, both of which are stable in animal wastes and are relatively potent androgens in fish and mammals. The purpose of this study was to evaluate the occurrence of 17α- and 17β-trenbolone in a beef cattle feedlot discharge and in river water upstream and downstream from the discharge. In conjunction with this, we measured *in vitro* androgenic activity of the discharge using CV-1 cells that had been transiently cotransfected with human androgen receptor and reporter gene constructs. Samples were collected on nine different occasions during 2002 and 2003. Whole water samples from the discharge caused a significant androgenic response in the CV-1 cells and contained detectable concentrations of 17α- and17β-trenbolone. Further work is needed to ascertain the degree to which synthetic androgens such as trenbolone contribute to androgenic activity of feedlot discharges.